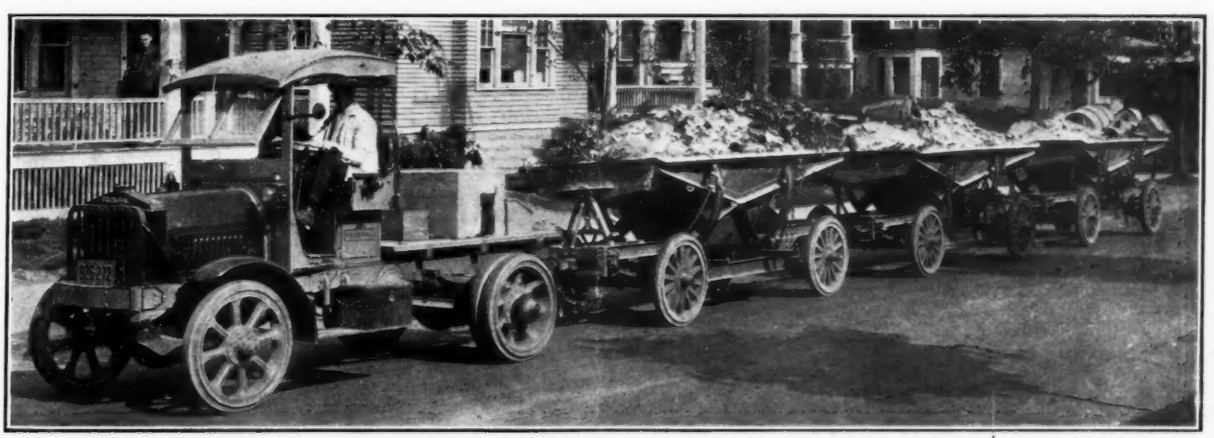
PUBLIC WORKS

CITY COUNTY STATE



COLLECTING REFUSE BY HORSE-DRAWN TRAILER AND TRANSPORTING IT IN TRAINS BY TRUCK TRACTOR.

IN THIS ISSUE

MARCH 19, 1921

in a separate casting and a mixing box. It will feed up to 1,500 pounds of lime or up to 3,000 pounds of alum in twen-

as it progresses and photographs of actual construction add to the thoroughness of the literature.

for the third installation, making a total saving of $102.30.

PUBLIC WORKS.

CITY COUNTY STATE

A Combination of "MUNICIPAL JOURNAL" and "CONTRACTING"

Entered as Second-Class matter at the Post Office at Floral Park, N. Y., August 27, 1920, under the Act of March 3, 1879

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Mechanical Snow Removal

Heavy snowfall quickly handled in hundreds of miles of New York streets by caterpillar tractors, plows and trucks.

The storm commencing about midnight of February 19 brought to New York in one day a snowfall of more than 12 inches accompanied by strong winds, making high drifts. Before daybreak preparations for removing the snow were commenced, and the large new $2,000,000 mechanical equipment of the street cleaning department was in readiness. More than fifteen thousand men, including employees of this department and some from the fire department, were mobilized for operations so vigorously that 19 hours after the storm began no less than 930 miles of streets had been so far cleared as to prevent serious obstruction and to maintain possibility of traffic in the most important thoroughfares. On the second day the street clearing was so far advanced that fire danger from snow conditions was considered to be past, and in another day or two the business and most of the residence streets were well cleared, although for some time longer snow remained piled in banks along the curbs of many of the streets, where it did not materially interfere with pedestrians or vehicles.

The important feature of this operation was the rapid removal of the snow from the center of the street and its collection along the curb by a fleet of tractors operating plows and the subsequent removal of the snow piles by the tractors pushing it to sewer manholes, and by power-dumping automobile trucks.

There were employed fifty 5-ton Holt caterpillar tractors rated at 40 engine h. p. and 25 drawbar h. p., which were equipped with Good Roads blade plows having blades 10 feet 6 inches long and 22 inches high, adujustable to any required height to clear irregularities in the pavement or to any horizontal angle with the direction of travel, and here set at 45 degrees, giving a cut 8 feet wide.

The tractors were assigned in pairs to prearranged routes, where they worked simultaneously in echelon passing up and down the street together, the forward tractor operating on the left-hand side of the center line of the street and pushing the snow toward the left curb while the rear tractor operated on the right-hand side of the center line, pushing the snow toward the right curb. Together they cleared a 16-foot space and then returning on the opposite sides, pushed the snow up to the curbs, making banks from 4 to 6 feet wide and about 5 feet in maximum height. They were operated successfully over all kinds of pavements, including some very rough cobble stones,

CATERPILLAR TRACTOR PLOWING SNOW FROM CENTER OF STREET TO CURB

MOTOR TRUCK EQUIPPED WITH PLOW TO SCRAPE SNOW TO CURB

MOTOR TRUCK DUMPING SNOW AT SEWER MANHOLES

and through drifts up to 6 feet deep at a speed varying from 3 to 5 miles per hour.

Their operation was commenced soon after the beginning of the storm and maintained continuously through it, thus preventing heavy obstruction and completing the removal of the snow from the middle of the street soon after the cessation of the storm.

After the centers of the streets had been cleared the tractors were equipped with plows having wings at both ends, with which the snow banks were attacked and large masses of snow pushed over the open sewer manholes, into which the snow was shoveled by gangs of men stationed there while the tractors returned for more snow. For this purpose the sewers were classified in accordance with their capacities, the largest ones being able to receive and dispose of unlimited quantities of snow, while smaller sewers could safely dispose of limited quantities, but care had to be taken not to obstruct them. No attempt was made to deliver snow to the smallest sewers.

The snow that was not disposed of through the sewers was removed as rapidly as possible by all manner of available trucks, both automobile and team-drawn, which were filled by an army of shovelers and by some experimental power machines. The truck service included 212 White 5-ton power-dumping motor trucks purchased for the routine removal of garbage, ashes and refuse, as well as for their availability in a crisis of this nature. The trucks hauled the snow to the nearest places where it could be dumped into the rivers, or to sewers. Some of the trucks were also equipped with scrapers and operated similarly to the tractors.

Each caterpillar machine required a crew of two men, one to operate the tractor itself (members of the fire department were used for this) and a street cleaning employee to operate the plow. Each machine used about 2½ gallons of gasoline and 3/10 of a quart of lubricating oil per hour. They worked continuously for many hours, developing ample power to do the heavy work and maintain remarkably high speed, and although they were handled by rather inexperienced operators no serious accident or breakdown was reported.

The main thoroughfares in the congested districts, chiefly below 14th street, were first attacked and afterwards the tractors were moved up Broadway and Riverside Drive and through the side streets between 59th street and 110th street.

On February 21, John Kenlon, chief of the New York Fire Department, said: "Fire danger from snow conditions is at an end. The streets are in such condition now as to give us little trouble in getting equipment to fight any blaze. The city won the wrestling match in this snow storm by a clean fall. It is the first big snowfall that has ever been handled within the first two days."

Street Cleaning Commissioner John P. Keough stated that the showing of the department was a clear demonstration of the power of scientific attack of snow by modern methods and that "apparatus costing more than $2,000,000 has been used for the first time on this snow and in my opinion it has paid for itself already. If this had not been used the private waste and loss to business in New York, due to obstructed streets, would have amounted to $10,000,000. Snow is going to be fought largely by machinery in the future."

A storm in New York a year ago required 12 days for the removal of the snow and it was estimated that the obstruction to traffic and delay entailed an economic business loss of $60,000,000.

The direct cost of removing the snow from this 12½-inch snowfall has been officially reported as $800,000 for emergency labor, $475,000 for extra pay to regular city employees, and $525,000 for truck contractors, no allowance being mentioned for gasoline, oil, repairs or overhead. The labor items, aggregating $1,275,000 plus regular wages of city employees, are sufficient to pay for 255,000 man-days at $5 a day. Twenty per cent for annual depreciation, repairs and interest on the equipment would seem to be a moderate allowance, and allowing one half of this for this storm (although it was the only one of the winter) would add $200,000, giving a total of $2,000,000 for removing the snowfall, in addition to the regular wages of the employees of the Street Cleaning and Fire Departments. The weather was extremely favorable, the sun having melted off the untouched snow by the time the snow forces had shoveled up the last of the piled snow.

It is probable that there has never before been such a high cost of removal of a storm of this depth under similar conditions. There was, to offset this, the advantage that never before had the main avenues been cleared so quickly for street cars and a practicable single traffic way on each side of them. In view of the vital importance of traffic to New York, this speed in providing for it was probably worth several times the million or more dollars it cost.

A Country Without Roads

Newfoundland, a British colony, is said to contain very few roads since practically all of the settlements are along the shore. English capitalists are about to establish paper and pulp mills on the island and the first necessity will be to build a system of roads leading from the coast into the interior where the plants will be located.

Trailers in Refuse Collection

More than a dozen cities have adopted this system and others are contemplating it. Some figures are given from service use in Indianapolis and Utica. With proper routing and careful management, this system is much cheaper than horse hauling, where the conditions are adapted to it.

The idea of employing trailers in collecting garbage, ashes and other municipal refuse is increasing in all sections of the country, the general features of such collection being those described by us in the issue of January 17, 1920.

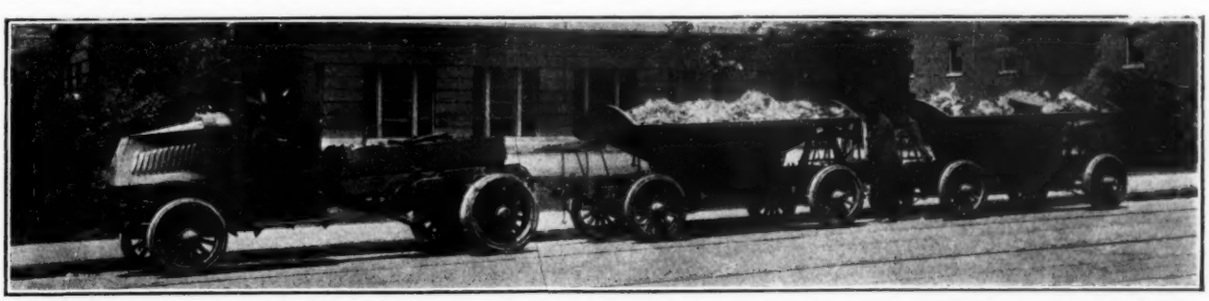
The latest information at hand gives the following cities as now using the trailer system: Syracuse, N. Y. (40 trailers); Utica, N. Y. (16 trailers); Dallas, Tex. (30 trailers); Indianapolis, Ind. (25 trailers); Bridgeport, Conn. (16 trailers); Passaic, N. J. (6 trailers); Detroit and Highland Park, Mich.; Cleveland and Akron, Ohio; Gary, Ind.; Kenosha, Wis.; Memphis, Tenn.; and Norfolk, Va. Other cities are considering and some of them are trying out the trailer system, these including Savannah, Ga., Philadelphia, Pa., Youngstown, Ohio; and Hoboken, Jersey City and Newark, N. J.

One reason for the increase in use of trailers is the fact that with the growth of cities longer hauls are necessary to find dumping places for ashes; that when garbage is used for feeding to hogs, the hog farms are placed at some distance from the city; and that the same is true of reduction plants. Long hauls by teams are too costly of operation and, because of low speed, require too many wagons and drivers.

In the matter of cost the experience of Indianapolis may be cited. Up to 1919 the Indianapolis Hauling Co. held a contract for removing ashes from the homes of the city and offered to continue the service during 1919 for $84,000 a year, with $54 additional for each acre of annexed territory, the contract to continue for five years. This price seemed so large that the city decided to perform its own collection and for this purpose bought four 5-ton trucks and 25 trailers. During 1919 these trailers collected 115,286 cubic yards of material and hauled it to the dumps. The operating cost, including oil, gasoline, tires, repair parts and labor, totaled $12,305; depreciation on an estimated life of seven years was $8,286, while 6 per cent interest was $2,784. The pay roll was $53,063, bringing the total cost up to $76,439, or about 66 1-3 cents per cubic yard of ashes collected. Meantime the city had annexed considerable territory which would have made the cost by the contract terms offered nearly $100,000. Each of the trailers held 4 cubic yards and each tractor pulled a train of 3 trailers and made six round trips a day. Four trucks and 24 trailers averaged 288 cubic yards a day, each cubic yard weighing between 1,100 and 1,200 pounds. Twenty-four trailers were in use, 12 being drawn by the four tractors to the dumps while the other 12 were being hauled by horses through the streets and collecting the ashes.

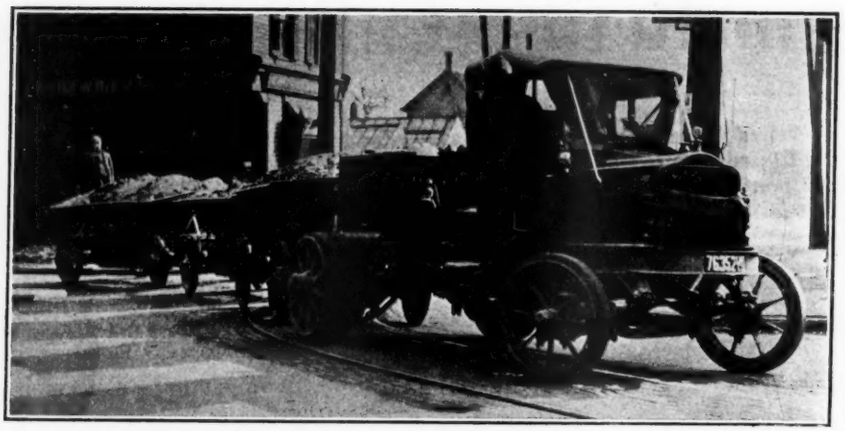
Between 90 and 100 tons of garbage are collected daily in Indianapolis, the collection being made by three 5-ton horse-drawn wagons by which the garbage is carried to a loading platform in the central part of the city where the garbage is loaded on cars and transported to the reduction plant located about four miles from the loading platform. The wagon hauls range from a few blocks up to 5 miles and the average number of loads per day is three. Some time ago a fire at the loading platform put this system out of commission for three weeks, and during this time the trucks and tractors were used for garbage collection also. It was found that one truck in an hour and a half collected as much garbage as a horse-drawn wagon collected in a day, including covering the four miles to the reduction plant instead of to the loading platform only.

This same system of operation, as previously described in former articles, is employed by all cities using the tractor and trailer system—the trailers are drawn by horses while collecting the garbage or ashes, are left at fixed points where are found empty trailers with which the team renews collection, while



COUPLING UP TRAIN OF TROY TRAILERS IN MEMPHIS, PREPARATORY TO HAULING GARBAGE TO INCINERATOR.
Capacity 4 to 4½ cu. yds., rounded load. Height to loading edge of body, 60 in.

OTHER ILLUSTRATIONS: THE TWO ILLUSTRATIONS ON THE FRONT COVER SHOW, THE UPPER ONE A 3½-YARD "HIGHWAY" TRAILER STARTING ON A COLLECTION TRIP IN SAVANNAH; THE LOWER, A TRAIN OF "ARCADIA" TRAILERS IN NEWARK, N. Y.



LEE TRAILERS WITH WHITE TRUCK TURNING A CORNER, HAULING ASHES IN INDIANAPOLIS

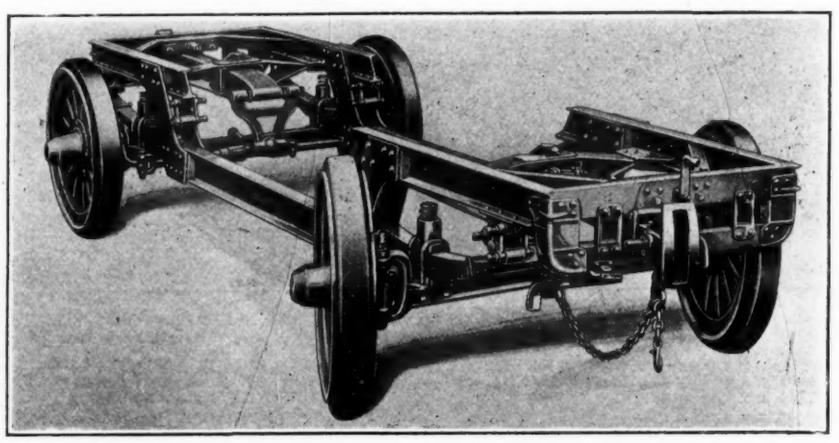
the tractors pick up three to five filled trailers and transport them to the dumps, incinerators, hog farm or other point of disposal. The capacity of a train of trailers ordinarily ranges from 12 to 20 cubic yards, and the speed from 8 to 12 miles an hour depending on road conditions, grade and number of trailers hauled.

Utica also began using tractors and trailers in 1919 for hauling garbage to a pig farm about 4 miles outside the city. It purchased two 5-ton trucks, sixteen 3½ yard trailers and 8 teams. Each team drawing a trailer is accompanied by two men and obtains a full load in 1½ to 2½ hours. Each truck carries four trailers at a time. The route to the pig farm is over unimproved country roads with grades of 7 to 8 per cent in some places. The 8 mile round trip requires about an hour, this including about 8 minutes for dumping the trailers and 10 to 15 minutes for uncoupling and coupling the trains in the city. The truck drivers are paid $3.50 a day and the other men $3.00. Six hours constitute the average day's work. An average of 749 tons per month is collected and hauled at a total cost of $4,032. Formerly when teams were used for all hauling, the average length of haul was only 1.6 miles. The ton-miles hauled by teams averaged 900 per month at a cost of $2.54 per ton-mile, while with the trailers the cost for the 3,000 ton-miles, including depreciation and all overhead, was $1.35 per ton-mile. Of this, labor and supervision constituted 55 per cent, supplies 7 per cent, and operation 22 per cent.

DESCRIPTION OF TRAILERS

Several companies are now furnishing trailers especially adapted for municipal work, one of their greatest advantages being the comparatively low lift of garbage or ash receptacles required in filling the trailer, the edge of the body being only 5 to 6 feet from the road, or 4½ to 5½ feet from the sidewalk level. This is accomplished by using a chassis with a drop frame. A general description which will fit almost any of the trailers is as follows: The drop frame chassis is fitted with a steel body that rolls to either side for dumping, an automatic lock holding the body in horizontal position and chains keeping it from rolling off the chassis when dumped. They are reversible, running equally well in either direction and steering by whichever pair of wheels is at front, the rear pair being locked in alignment with the frame. A train of any number tracks with the truck or tractor when turning corners. A swivel draw head with bumper is provided at either end for coupling the trailers together, the draw head having springs to cushion the shock of starting and stopping. A draw bar is provided for attaching the first trailer to the rear end of the truck or tractor and a tongue for hitching the team to the trailer. Some makes have a seat at either end for the driver of the team. Steel frames are generally of I-beam or channel construction. There are steering knuckle axles with roller bearings for the wheels, semi-elliptical springs, shackled to the frame, and solid rubber tires. The special trailer mechanism is a drawhead swivelled to draft beams bolted to the frame and connected by hinged yokes and tie-rods to the steering arms. The weight of a trailer, complete with body, is about 4,000 pounds for the 2-ton size, 5,000 to 6,000 pounds for the 3 to 3½-ton size, 6,000 to 7,500 pounds for the 5 or 6-ton size. The prices are approximately $1,885 for a 2-ton trailer, $2,100 to $2,550 for the 3 to 3½-ton, $2,500 to $3,500 for the 5 and 6-ton.

A good truck is able to draw two or three loaded trailers if the grades do not exceed 5 or 6 per cent and the streets are hard surfaced. An ordinary team of 1400-pound horses can draw a 2½-yard trailer in collection work six days a week under similar street conditions. Their daily travel is only from 10 to 15 miles, the trailers run easily on roller bearings, stops are frequent so that the animals get plenty of rest, and the trailers start empty each time and do not accumulate their full loads until near the end of the collection route.



CHASSIS FOR 3-TON DROP-FRAME TRAILER
All-steel construction; double-end steering and connections to coupling draw-heads

To secure the maximum efficiency with the use of trailers requires careful study and management, routing of trailers in collection, location of stations where trains and trailers are made up, etc. It will ordinarily require a little time of preliminary use in actual service for the schedule of maximum efficiency to be determined upon and for training the employees to work rigidly to the schedule adopted. The tractor must not have to wait many minutes for the arrival of the loaded trailers, nor should the teams have to wait long for the arrival of the tractor with empty trailers with which they can again begin collection. The number of trailers and capacity of tractor must be carefully estimated by a study of the size of city, density of population, grade of streets as affecting collecting time for filling trailers and amount which horses can draw. With all these properly considered, however, and where the refuse is to be hauled more than a mile or two after the collecting vehicle is filled, there would seem to be little question that in the majority of cases the tractor-trailer system would be much more economical than doing all of the hauling by horses.

HIGHWAY TRAFFIC

Report of a committee of the New Jersey State Association of County Engineers, gives synopsis of results of a questionnaire.

The New Jersey State Association of County Engineers in 1919 appointed a committee on present and future traffic conditions, which committee submitted its final report a few weeks ago. In the meantime it had sent a questionnaire to the various state highway departments and to a number of engineers of counties and of cities. Replies were received from 23 state highway departments, 21 counties in 7 states, 5 cities in 4 states, and a chamber of commerce, automobile club and the auto trade association.

That there is a lack of dependable traffic data in the country and no common terminology of traffic nor common basis of information obtained is the conclusion of the committee after studying the 52 replies received to its questionnaire.

Such traffic data as are available have been taken in different ways, with different units and for different periods of time, so that comparison is impossible and unavailing. For instance, one informant suggested that 2,000 be taken as the limit of "light traffic," while another suggested that 200, but the context indicated that the former meant the pounds weight of a single vehicle while the latter meant the number of vehicles per 24 hours. This illustrated that the word "light" is commonly used in both senses.

In its questionnaire the committee asked for the opinions of those replying as to what terms should be used in traffic classification, asking whether the terms "heavy and light" should be used or "commercial and pleasure"; also whether the classification should be based on maximum traffic or on average traffic. In this question it apparently made no effort to solve the confusion between weight of vehicles and number of vehicles in the use of the above terms. In the replies, 33 recommended "heavy and light" and 19 recommended "commercial and pleasure"; 29 suggested that the average or average maximum traffic be made the basis of classification and 27 that the maximum be so used.

Of 47 replying to the question whether they had taken dependable traffic records, 33 had no records at all and 14 others had records of which only a few were considered dependable.

Paved portions of roadways were reported as varying from 9 feet to 60 feet in width, 36 naming 18 feet and 25 naming 16 feet. The space from gutter to gutter varied from 20 feet to 60, between 24 and 36 being the widths generally required, with 32 as an average. The width of the entire roadway between property lines varied from 20 feet to 120, with 50 most common and 60 as the average of all.

Twenty-four of the replies stated that some of the roads had reached the traffic limit, and thirty replied that none had yet reached such limit.

Replies to inquiries as to the probable percentage in automobile traffic during the next 10 years showed opinions varying from 30 to 500 per cent, with the general belief that commercial traffic will increase faster than pleasure. There was practically unanimous opinion that total loadings would tend to increase.

In replying to some general questions, there was a practically unanimous opinion that railroad grade crossings should be eliminated; that pavement widths should be greater in populous sections, although only about three-quarters considered greater width necessary for roads; while the suggestion of parallel roads on main routes to provide for one-way traffic roads and for dividing commercial and pleasure traffic was approved by 22 and disapproved by 7.

The committee paid special attention to the matter of classifying traffic and quoted the units used as the basis of counts by different cities and counties. It presented a traffic census sheet as a suggestion for a standard to be adopted throughout the country generally. This classified the traffic as follows: Motorcycles, light horse, heavy horse, pleasure motor cars, light motor trucks, and heavy motor trucks, each of these except motorcycles being further divided into empty and loaded; also 10-ton specials, 15-ton specials and over 15-ton specials, and street cars. The last column is provided for the total. A line is given for each hour of the 24. The assumed weights of the several units are given as follows, in tons: Motorcycles, 0.25; light horse, empty, 1.25; light horse, loaded, 2.00; heavy two-horse, empty, 3.20; heavy two-horse, loaded, 6.20; light pleasure motor, 1.50; heavy pleasure motor, 2.50; light motor truck, empty, 1.00; light motor truck, loaded, 2.50; heavy motor truck, empty, 5.00; heavy motor truck, loaded, 10.50.

body that rolls to either side

All-steel construction; double-end steering and connections to coupling draw-heads

In an effort to provide some method of classifying roads in accordance with number of vehicles using them, the committee recommends that roads carrying 100 vehicles per 24 hours be called traffic No. 1 roads, those carrying 200 vehicles traffic No. 2, etc. This would still leave the character of the traffic undescribed and this would vary greatly in different sections and on different roads.

It is also recommended that traffic counts be taken on each road 4 times a year, on 3 consecutive days each time, each period to include a Sunday or other heavy-traffic day.

A few general suggestions were given by the committee in concluding this report, among these being that plans for highway systems should be made for a period of 20 years ahead, subject to such modifications as future developments or knowledge might indicate; that wide rights-of-way be obtained and roads laid out with flat curves and easy grades. Also that wider and stronger bridges be built so as to provide for increase in number and weight of vehicles during the 10 or 20 years which should be the least life of the structure.

Good Roads in Argentine Republic

The Argentine Republic has recently organized a good roads association which already has about 300,000 members and which is backed by the Minister of the Interior and has been promised every possible aid by the government.

The Indiana Highway Commission

The State Board of accounts of Indiana on February 17 submitted a report on the Indiana State Highway Commission which has occasioned considerable stir in that state. The report goes extensively into some of the methods and certain specific doings of the board and recommends a number of changes in the method of administering the state highway department. The governor has stated that he regards the trouble in the highway department as mostly administrative and is not in favor of any radical changes in the department itself.

The most important changes have to do with the finances of the department rather than the results obtained. It recommends that payments be made for road work by the auditor of the state directly to the persons to whom the money is due, rather than to the director of the highway department to be in turn paid out by him from time to time; it having been the practice to turn over to the director sums of $100,000 at a time, which sums he would place in the bank to his account to pay out as became necesary. Many purchases had been made without obtaining competitive bids as the law required. The cost of "administration, salaries, new equipment, repairs of equipment, transportation and all other expenses pertaining thereto" was 31.7 per cent. of the total expenditure in Indiana, but only 5.7 per cent. in the state of Ohio. The minute books of the department are said to be incomplete and confused in their records. Advances of freight costs were made to certain contractors without any legal authority therefor, which also was considered unfair to the other contractors. Testing laboratories were paid $5,000 for testing road materials although the law provides that this shall be done by Purdue University.

Governor McCray does not believe that any legislative action is needed. The board was not organized until 1919 and was immediately called upon to spend approximately $5,000,000, and undoubtedly fell into some mistakes which would not have occurred had it had opportunity to develop and organize leisurely. Some are now advocating the entire abolishing of the highway department and turning the work back to the counties, but it does not seem probable, as it certainly is not desirable, that this be done, however necessary it may be to improve the methods by which the state highway department operates.

The Georgetown Bridge*

Construction of floating falsework and erecting and shifting trusses.

FALSEWORK

The arch trusses, in pairs 7 feet apart on centers, rigidly braced with transverse and diagonal angles, were erected on floating falsework, in preference to erecting them in position on piers by derricks installed on the bridge piers or swinging them to place by a large floating derrick which was not at hand and could not be economically built for the purpose. The falsework consisted of a center tower under the crown supporting the lower chord for a distance of 97 feet, and two inclined jack bents supporting the lower chord at the haunches about 65 feet each side of the center point.

The falsework was made with nine transverse bents each having two inclined posts braced with transverse struts 8 feet apart vertically and the panels X-braced with planks spiked on. The center bent is made with 12 x 12-inch batter posts and the others with 6 x 6-inch batter posts, all of them resting on a group of pontoons firmly braced together.

The 24 x 80-foot center pontoon has its axis coincident with that of the pair of arch trusses and is firmly secured to a transverse 22 x 75-foot pontoon at each end of the group, making a symmetrical letter H, with the ends of the transverse pontoons tied by ¾-inch wire rope to the center points of the long sides of the 24 x 80-foot pontoon.

The pontoons were reinforced by a set of ten 12-inch I-beams parallel to the bridge axis across the deck of the center pontoon, and at each end and overlapping at their ends a set of six 12-inch I-beams continued across the extremities of the 80-foot pontoon and entirely across the full width of the transverse 75-foot pontoon.

The I-beams were securely clamped together at short intervals by ¾-inch U-bolts and bearing

*Continued from Page 223

plates engaging them and the solid fillers, and were also clamped to the decks of the pontoons by top and bottom yoke timbers extending across the full width of the pontoon and connected by vertical tie rods with nuts at both ends. The end tower bents were supported on the decks on the transverse pontoons, adjacent to the bearings for the inclined bents that took very heavy loads from the trusses projecting cantileverwise a long way beyond them.

The pontoons and falsework draw about 2½ feet of water and the weight of a pair of ribs displaces one additional foot of water. This was an important point in determining the height of the falsework.

ERECTING TRUSSES

The pontoons with falsework were anchored close to and on the down-stream side of a completed pier on the Virginia side. As the boom on the derrick scow could not reach high enough to place the center section of the ribs, a gin pole was placed on top of the pier and leaned over the edge toward the scows.

In starting the erection, the two center sections of one rib were placed first, then the corresponding sections of the second rib. After this a section was added to each rib on one side of the center and then a like section added to the other side in order that the load would be more uniform on the scows.

All joints were milled and made so that a little drifting was required to draw them up tight. The steel connections were bolted, therefore by a little drifting on the holes a much better joint was obtained. Each joint was fairly well bolted up before hanging the next section.

Four winches were placed on the pontoons, one on each end of each of the end pontoons to handle the four 3-inch anchor lines, two down-stream to concrete blocks dropped on the river bed, and two up-stream fastened to piers of the old Aqueduct bridge.

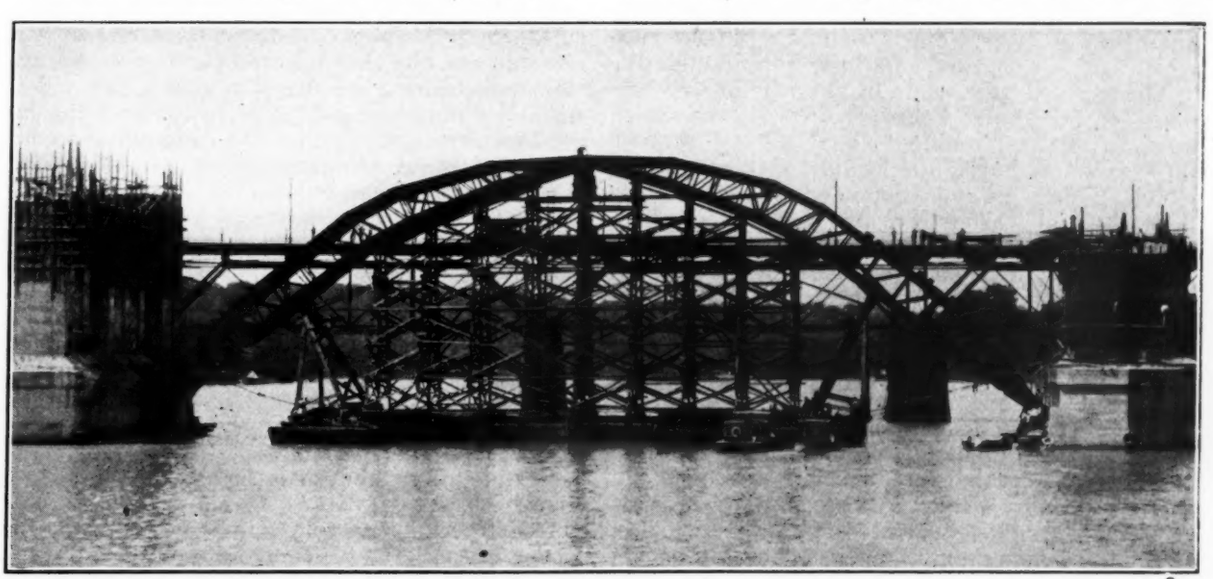
The river at the bridge has a tide variance of from 1 foot to 3 feet, which was taken advantage of in placing the steel. At least 2 feet of tide was necessary, preferably more, due to clearance required and the pontoons being submerged 1 foot. The operations were calculated for mean low water. Heavy rains on the water-shed of the Potomac caused a week's delay in placing the first set of ribs. If the wind blows down the river for some hours it has an appreciable effect on the water level.

The falsework and ribs expose quite a surface to the wind and its pressure is noticeable. All of these things and time of high tide were considered in setting a date to float a pair of ribs in place.

The up-stream hawsers were strung between the piers of the 208-foot span, thence across the river to the pontoons and fastened to the winches. The down-stream hawsers were run from the winches diagonally down-stream across to the concrete anchors. Several holding lines of 1½-inch manila rope were fastened wherever they could be, and had to be changed several times. By taking in on the hawsers with the winches and paying out on the holding lines the falsework and ribs were hauled across the river to the center span and then pulled directly up-stream into place, final adjustments being assisted by lines attached to eyebolts built into the piers for that purpose.

Just before going in between the piers four tackles were rigged from the pontoons to the piers, one from each corner, to prevent any side movement and to help in pulling up to final position. When the final position was reached four turnbuckle rods were attached to the ribs and the piers, one up-stream and one down-stream at each end, to hold the ribs in the exact position required. The steel wedges were dropped in place between the shoes and the wall plates and held in position.

As the tide ebbed the ribs descended until the shoes rested on the grillage beams and slid back



FIRST SET OF ARCH RIB TRUSS CENTERS IN POSITION BETWEEN PIERS 2 AND 3 AND STILL SUPPORTED ON FLOATING FALSEWORK ON WHICH IT WAS SUBSEQUENTLY TRANSFERRED TO ANOTHER SPAN.

until the steel wedges caught tight. Just about the time the shoes started to slide back the through bolts at the crown pin were loosened so the ribs could adjust themselves. This was an important point for the milled surfaces of the cast steel hinges are on radial lines. When the tide ebbed sufficiently the weight on the pontoons was released and they finally floated free. The pontoons and falsework were worked out and back across the river, to get another pair of ribs, by the same lines that pulled them into place.

The second pair of ribs was placed alongside of the first pair in exactly the same manner, but in order to hasten the work and finish before dark about one foot of water was pumped into the center pontoon. Sheet lead was placed under the shoes to give a uniform bearing.

The foreman and about 14 structural steel workers averaged about 14 days of eight hours in assembling a pair of ribs on the pontoons and falsework, also an engineman and fireman were needed to work the gin pole when being used and the same required on the derrick scows when it was in use. About 75 men were used to place the first pair of ribs, but profiting by experience, the fourth pair of ribs was placed with 9 men, there being no wind to contend with.

RIB FORMS

On the top chords of the arch trusses there were bolted, close together, 12-inch transverse I-beams 20 feet 9 inches long, overhanging the centers of the trusses about 2½ feet at one end and 7¼ feet at the other end. These beams supported 9 x 12-inch timbers 3 feet apart, that were parallel to the trusses and carried the 3-inch transverse lagging planks 18 feet long which made the bottoms of the forms for the arch ribs. The 9 x 12-inch timbers were dressed convex on the upper side to correspond with the curve of the intrados, and were blocked up on top of the 12-inch I-beam flanges as necessary to bring them to the exact elevation.

After the center rib was concreted the two pairs of trusses under it were moved apart transversely until they were concentric with the outside ribs which were concreted on them simultaneously.

The vertical side walls of the rib forms were made of horizontal boards nailed to the inner faces of vertical outside posts bearing against three rows of horizontal waling pieces through which ½-inch tie-rods extended across the rib with nut and washer bearings at the end. The lower edges of the side walls engaged the vertical faces of 3 x 6-inch waling pieces bolted to the floor lagging and the bottoms and middle points of the walls were braced by inclined outside struts with their lower ends engaging angle blocks bolted to the top flanges of the 12-inch transverse I-beams at their extremities.

The blocking, decking and form for an arch ring were built in about two months by about 25 carpenters and three foremen with whatever aid was required by a derrick scow or the cableway. A foreman and 8 carpenters generally worked about three days in building the form for a pocket of a single concrete section and placing a small amount of reinforcing steel at the intrados and extrados and construction joints where a girder or column would connect.

CONCRETING

Concrete is made with cement delivered by the railroad on a track running under one end of the bridge, and sand and gravel are transported by water and unloaded by a clam-shell bucket operated by a derrick boom.

A floating concrete plant was installed on two pontoons lashed together side by side, having an Insley tower, ¾-yard mixer and storage bin on one end and at the other end a boiler and stiff-leg derrick rigged with a ¾-yard Blaw-Knox power wheel bucket to handle sand and gravel from scows into the bin over the mixer. The plant is towed wherever wanted and is very efficient.

The concrete not mixed in the floating plant is mixed in a land plant served by a Lidgerwood cableway of 1,700 feet clear span and stationary towers 145 feet high. This cableway distributed both concrete and materials along the full length of the bridge.

A 208-foot arch ring of the 208-foot span was concreted in 13 pours of 25 blocks. A key was left at the crown to be poured last and on either side of the crown a form was built to pour a block. These two were poured first, then a block on either side at the haunches, then alternating between the crown and the haunches and finally the keys at the crown. Two corresponding blocks of concrete were nearly always poured in one day. The bulkhead of a section was taken off the next morning after pouring, the side forms were left on till all concrete was poured, but were taken off a couple of days after completing the arch ring. The steel ribs were left in position 30 days after pouring the key at the crown.

SHIFTING TRUSSES

When ready to remove the steel ribs, the pontoons and falsework were floated in underneath at low tide and held in position until the tide had risen high enough so that the water displaced by the pontoons after bearing heavily against the ribs was more than equal to the weight of a pair of ribs, which is about 200 tons, the wedges were released and the ends allowed to drop so that the ribs took bearing on the jack posts. To aid in removing the wooden wedges hydraulic jacks are used to lift heavily against the concrete and compress the timber blocking. When the tide ebbed the pontoons floated out.

The other principal items of plant involved in the construction of the bridge include two derrick scows and one boiler scow, two 5-inch pulsometers, one 6-inch Emerson pump, one 8-inch pulsometer and one Ingersoll-Rand air compressor.

The floating equipment was largely owned by the Engineer Corps of the United States Army. The cableway was operated by a Lidgerwood hoisting engine located at the Georgetown end and was equipped throughout with Leschen wire rope, including the main cable 2¼ inches in diameter.

Construction was commenced in August, 1917, under Col. W. L. Fisk and is now in charge of Major M. C. Tyler, District Engineer, and Major L. E. Oliver, Resident Engineer.

PUBLIC WORKS

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CONTENTS

Promising Anti-Strike Action

The menace of industrial and construction strikes is an increasing evil that has cost this country probably more than the direct war debt. Its danger is due to the organization of unions and their unscrupulous methods, but with the elimination of the organization alone its terrors would vanish. The unions have been able to concentrate their combined resources in the aid of any given strike and, aided by political influence and class legislation, have generally been more powerful than their opponents, who have effected little or no organization to oppose them.

The recent formation of an insurance company especially devoted to strike risks offers a very important advantage to individual and corporate employers, and makes possible a far stronger resistance to strikes by definite liquid assets that can already be measured by large sums of cash and can easily be developed, if it appeals (as it is likely to do) to business and capital interests, to amounts far superior to the resources of the union, large as the latter are.

Such support will not only give strength to contractors and owners and assist them in critical periods, but it will vastly increase their confidence and in similar measure will make the strikers hesitate. Obviously, if it flourishes, the strike insurance will effect a very real universal organization founded on the highest business, moral and financial principle and may do more than any previous methods have accomplished to produce co-operation and co-ordination in construction interests and greatly reduce the liabilities and losses therein.

Apparently the policies have so far been issued chiefly to shops and factories that have already collected payments in various states. There is however no reason why it should not be rapidly extended to all kinds of construction interests and operations, and whatever authorizations, legalizations and formalities are necessary should be quickly effected so that there may be no opportunities for attacks such as that of the Printers' Trades Association, which on a technicality has caused the temporary closing of the New York office. The prompt action of the union in making this attack is the best evidence that could be had of the importance of this new application of insurance and the necessity of defending and encouraging it.

Although the rates appear high, and many employers have heretofore been able to avoid large direct strike losses without formal insurance, it must be remembered that in most cases they have paid heavily by acceding to demands that, if refused, would have caused strikes which, had they been insured, would have been covered by their policies. An extension of the policies to cover the losses of the owners through delay in construction and other consequential damages would evidently make the strike policies of enormous value to all of those closely concerned with construction work.

Collecting Refuse

More than $30,000,000 a year is spent in collecting refuse, and if all cities fulfilled their complete duty in this respect, the amount would probably exceed $60,000,000. Any improvements which will decrease the cost of this service will therefore make a material reduction in our municipal expenditures.

One of the latest developments is the use of trailers and tractors, as described in this issue. Where conditions as to amount of refuse to be collected, length of haul, grades and other conditions are favorable to this plan, it will apparently effect a considerable saving over the use of ordinary horse-drawn vehicles.

The advantage of the tractor is the speed with which it covers long distances and the fact that three or four collecting carts can be taken at once with a single tractor and driver. Where there is a single short hill up which the tractor could draw only one or two trailers at a time, it can break the train and carry the trailers up in several trips; but ordinarily if the hill is long or there are several of them, this condition eliminates much of the advantage of the trailer.

The trailers furnished for this purpose have several advantages over the ordinary collecting wagon. One of these is a feature which we have urged for years, but we feared to deaf ears, for only within a comparatively few months has it seen anything like general adoption. This is the reducing of the height

of the top of the body so that the refuse container need not be elevated more than shoulder high to dump it into the wagon. The trailers offered for refuse collection, with their drop frame, embody this most desirable feature. The bodies are entirely of metal and are watertight and are easily cleaned and do not absorb liquids or give off odors.

It has been reported by most who have made practical comparisons that it is considerably more economical to collect by horse-drawn vehicles than by motor vehicles, where conditions require only a short haul of not more than half a mile after the wagon is filled. Recently, however, one or two investigators have expressed the opinion that improvements in vehicles and increased cost of horses and the feeding and maintenance of them have greatly diminished this difference and may even reverse the advantage in certain cases.

In this country very little trial has been made of electric vehicles for collecting, but in England a considerable number of cities have tried electric motor wagons for collecting refuse and find them considerably more economical than the gasoline vehicles. Where the refuse is burned and the heat is used for creating steam, it would seem to be practicable to use this last for creating electric power which, in combination with storage batteries, could be used for charging the batteries of electric collecting vehicles. At least one city in this country has tried this plan, Paterson, N. J., having reported last year that it used four electric trucks and three gasoline, and that about half of the current for charging the electric trucks is obtained by use of the steam from its refuse destructor.

It seems certain that there is still great room for improvement in appliances and methods employed for collecting refuse and it does not seem unreasonable to anticipate that the cost of collection will be reduced by 50 per cent. Meantime, our progressing ideas as to the duties of municipalities in the collection of refuse will lead to increasing numbers performing this service more thoroughly than ever, so that on the basis of present costs the expenditures would probably increase in a few years to $60,000,000 or even $100,000,000 a year. Increasing the efficiency by 50 per cent would therefore probably mean the saving to the country of $30,000,000 to $50,000,000 a year—an amount certainly sufficiently large to serve as an incentive to an intelligent and exhaustive study of the subject and the evolution of improvements in its various processes and appliances.

Inspecting Water Works Valves

The city of Chatham, Ont., has been trying to improve the pressure in its distribution system in order to secure better fire protection, but without satisfactory results. Finally, a few weeks ago it was found that one of the water mains leading from the pumping station to the business section of the city was entirely out of service because of a closed valve which, as nearly as could be found out, had been closed two years previous for making repairs and had not been opened again.

Theoretically such a piece of carelessness should not have occurred, but oversights are always possible and even probable occasionally. There are probably scores of cities in this country in which at least one, and perhaps several, valves are closed undesignedly and are cutting down the effectiveness of the distribution system.

The only reliable method of avoiding such detraction from the full effectiveness of a system is to make periodical examinations of all valves in the system. Either by a map, a card catalog or other method, a list of all the valves in the distribution system should be recorded, each having its own number. The testing of the valves should then be insured by checking them off on the list each time and recording the date of test for each valve. The tests should include closing and opening the valve, listening meantime to ascertain that the valve when closed passes no water (which may be determined by the absence of any singing of the passing water). Also, inspection should be made to learn whether water leaks from the stuffing box when the valve is open. In addition to these periodical inspections (which it is desirable to make at intervals of six months if not less), the superintendent, or a trustworthy assistant, should visit every valve which is known to have been closed for the making of repairs or other purposes, to make sure that it has been opened again by the workmen engaged on such repairs.

Strike Insurance

There has recently been formed The Employers' Mutual Insurance and Service Company, Baltimore, with a capital of $2,000,000 that provides insurance against loss from labor strikes. It already covers 37 trades in 25 states, has directors of financial and industrial prominence in New York, Baltimore, Philadelphia and Boston, and has issued policies to more than 50 large industrial firms. It is said that a number of important insurance companies are preparing to take advantage of a new law pending in Connecticut that will permit them to assume risks of this nature.

Besides insuring against direct loss due to strikes, the company maintains a service department with local secretaries scattered throughout the country who act as mediators when required. It is estimated by the company that there may be more than 100,000 strikes in the next two years and that in those lines where the company has already operated 76 per cent of the threatened troubles have been averted.

It is reported that, for a premium of 1¼ per cent of the fixed charges and profits, the company will pay 80 per cent of actual losses up to the face value of the policy.

A branch office has been opened in New York City, and it is claimed that a large amount of insurance has been written there for local employers. Complaint was made by The International Allied Printing Trades Association that the operation of the New York office was in violation of the New York State Insurance laws and, asserting that it encouraged discord between employers and employees, they entered a protest with the State insurance commissioner, who ordered the representative of the insurance company in New York to suspend operations in that city.

Road Bids High

On March 2nd the Pennsylvania State Highway Department announced that it was rejecting all bids received on February 18th and 19th for construction projects in various parts of Pennsylvania. In connection with this, State Highway Commissioner Sadler announced that he felt that the prices submitted on a great majority of the projects did not reflect sufficiently the downward trend of prices for labor and materials; and while it was urgent that every effort be made to complete the contemplated construction program, on the other hand the resources of the state should be conserved.

The average cost of constructing roads in Pennsylvania last year was, we believe, about $60,000 a mile, but it is reported that the bids received for 104 miles of road this year averaged $70,000 a mile, thus being higher instead of lower, as the falling costs of labor and material would seem to indicate that they should have been. "The projects will be readvertized within a short time with a view to obtaining more reasonable proposals."

On February 18 the Ohio Division of Highways also received bids for about 125 miles of pavement and also for several miles of grading; but these bids were so high that Governor Small has directed that they be rejected.

Patented Pavements Permissible in Illinois

Under decision handed down by the Supreme Court of Illinois, an act passed in 1919 by the Illinois State Legislature regarding pavements is declared constitutional. Prior to that year, the use of patented pavements by the several cities of the State had been prohibited under the Supreme Court's decision of the then existing law. The Legislature then passed an act permitting municipalities to contract for patented pavements provided they are placed in competition with unpatented pavements.

Pursuant to this, the city of Rockford, Ill., received proposals for several types of pavement, including Warrenite-Bitulithic, patented by Warren Brothers Company, Boston.

A taxpayer, R. J. Schult, brought an action to restrain the contract on the grounds that the act of 1919 was unconstitutional and that the proceedings had not fully complied with the act. The Supreme Court in unanimous opinion written by Mr. Justice Carter decides against the plaintiff taxpayer on all points and sustains decision rendered by the County Court more than a year ago.

Alabama's Highway Bond Election Illegal

Early this year Alabama voters adopted a bond issue of $25,000,000 for road improvement, but the election was declared by the Supreme Court to be illegal because the legislature had delegated to the governor the appointment of the day for the election on the bond issue, whereas the constitution required the legislature itself to set the day. A rehearing was asked, but the Supreme Court reiterated its decision.

It is believed that this means either an extra session of the legislature or the losses of federal funds totaling about $4,000,000 which are available when the state of Alabama duplicates the sum for highway construction. At the time of this writing it is not known what the governor will do in the matter. The state highway department had perfected a state organization for carrying on the road work in order to be ready for actual construction at the earliest possible date, and had done a considerable amount of preliminary work. Contracts already let will require all the funds which the state can appropriate if highway bonds are not issued, and this probably will result in the temporary abandonment of the work which had been inaugurated.

Road for New York-New Jersey Tunnel

A report was submitted in February to the New York State Bridge and Tunnel Commission and the corresponding New Jersey commission, by an advisory transportation committee which had been requested to study some of the problems involved. This committee consisted of managers of motor vehicle departments of express companies and other firms using large numbers of trucks, such as the Borden Milk Co., Tidewater Oil Co., Burns Bros. Coal Co., and a few officers of motor truck manufacturing companies.

To the question what minimum width should be given a two-line roadway, having in mind traffic demands, cost of construction, maintenance and operation, and the difficulties of construction, the committee recommended a twenty-foot roadway as providing sufficient clearance.

To a second question the committee reported that the ultimate size of automobile truck will probably be determined by legislation or by conditions growing out of the width of existing highways, and that the width will probably be limited to eight feet.

In reply to other questions submitted, the committee recommended that all vehicles be compelled to keep in the line in which they start, not passing each other except in case of a wreck. It is believed that the roadway should not be crowned but should be flat and that there should be no grooves or curbs between the lines of travel, the only indicator being center line markers to assist the police in regulating the traffic. No repairs to disabled cars should be permitted in the tunnel if they involve a delay exceeding one minute, but any disabled truck should be immediately hauled out by special cars maintained by the commission for that purpose. The railroad system of signaling should be adopted. A sufficient police force should be employed to enforce the rules adopted so that the traffic can be handled expeditiously. Concerning the question of cleaning the railway of oil and gasoline so that a safe roadway may be had and fire hazard eliminated, the committee recommended the use of torpedo sand and mechanical sweepers, together with fire extinguishing apparatus of both emergency and permanent types.

Construction Questions Answered

Suggestions as to methods, "wrinkles" and appliances that may be used to overcome difficulties arising in construction work. We invite questions concerning such problems that may arise from time to time in the experience of any of our readers. Answers prepared by competent authorities will be published promptly. It is hoped that others who have solved similar problems different will send us their solutions for publication also; or describe new "wrinkles." If it is only a new way to drive a nail, it may help some one.

How Can a Small Quantity of Fine Sand be Graded for Use in a Filter?

By washing in a filter. By washing with adjustable water supply in an overflow hopper. Accuracy and rapidity attainable with very simple equipment.

Editor, PUBLIC WORKS.

Dear Sir:

Can you inform me as to what would be the most economical method of washing approximately 150 cubic yards of sand, for filtering purpose. The sand as obtained from the bank shows an effective size of about 0.15 millimeter. It is required that the sand stand at least 0.25 millimeter.

I have tried screening with a 12 mesh to the inch screen, but find that not enough fine stuff can be removed by this method to bring the sand to 0.25 millimeter.

Any information you can give me will be greatly appreciated.

Very truly yours,
CONTRACTOR AND ENGINEER.

It is generally impossible to sift fine sand accurately in large quantities in a reasonable time and cost and the simplest and most rapid and most economical method of grading it is by the wet process, which is generally a matter of suspension rather than of washing, although it generally serves to wash out loam, dirt and clay and leave the accepted sand clean and uniform.

UTILIZATION OF FILTER

For the small amount of sand mentioned it will not be profitable to install a large, elaborate or expensive separating apparatus and it may not be necessary to install any if the sand can be delivered immediately at the filter and if the engineer of the filter will permit the use of the filter itself for grading the sand.

As sand filters are washed at very frequent intervals by a reverse current of water going upward through the sand bed and carrying off in suspension the sediment and fine materials collected there, the same process may properly be applied for the grading of fine sand for use in the filter bed and for the removal from it of earthy matter and portions of the sand that are too small for the requirements. This method does not in any way threaten damage to the filter and as the work may be performed quickly it should not under ordinary conditions be objectionable. It has been employed for removing from operating filters sand therein finer than was desired.

If the particles that are too coarse have already been separated from the sand, the remainder may be placed on top of the sand already in position in the filter bed and the washing water turned on from below will pass through it and float away the particles that are too fine, which should be carried off through the overflow gutters, leaving only the larger, acceptable grains, in position in the filter bed, where, if they form too thick a layer, a portion can be removed and stored and the remainder left in position for immediate service. The size of grains remaining can be closely governed by adjusting the pressure of the washing water so that the velocity of the overflow conforms to that required to hold in suspension all particles lighter, and consequently smaller, than the required grains.

These operations are easily and rapidly performed, will not keep the filter long out of service, and are probably the cheapest and simplest method of grading a small quantity of fine sand.

GRADING BY HOPPER

If the filter washing method is not available, a few hundred yards of sand can easily be graded, wherever it is stored, by means of an overflow hopper and a supply of running water under a pressure of 10 pounds or more.

For a small amount of sand with water at a moderate pressure the apparatus indicated in the sketch will be found convenient, cheap and efficient. A pyramidal wooden hopper about 3 feet square at the top is firmly supported at a convenient height above the ground and is provided with a water supply through a valve on a 2-inch pipe with its outlet at the apex at the bottom of the hopper.

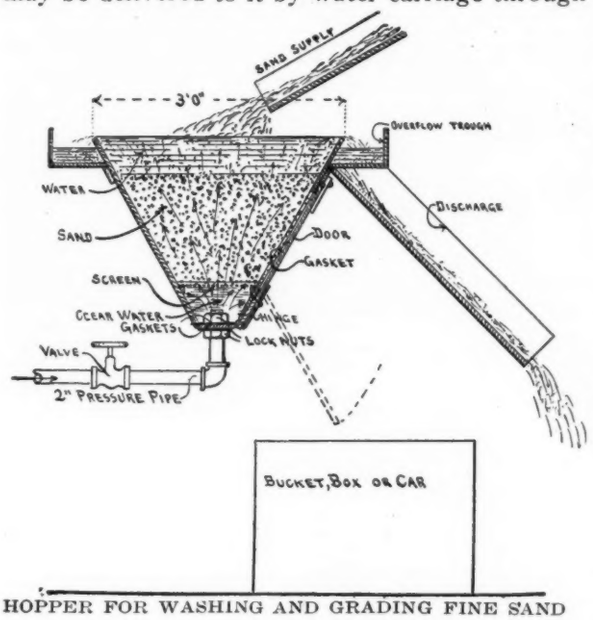
A few inches above the bottom of the hopper there should be placed a removable horizontal screen with a mesh of about the size of the required sand grains, to serve as a barrier to prevent the sand from reaching the open outlet of the pipe and also to act as a distributor spreading the upward flow of the water over a larger area and leaving below it a pressure chamber filled with clear water.

A large opening covering most of one side of the hopper should be closed by a door hinged at the bottom and provided with a gasket that

should be attached to the sides of the hopper, enclosing all sides of the opening. The gasket may be satisfactorily made of a small rubber pipe engaging shallow grooves in the exterior of the hopper and in the interior of the door.

The top of the hopper should be surrounded on all sides by a trough a few inches wide and deep connected at any convenient point with an outlet trough or spout to discharge the overflow water and waste material.

Sand is shoveled by hand into the hopper or may be delivered to it by water carriage through



HOPPER FOR WASHING AND GRADING FINE SAND

a trough or inclined chute which may, if desired, be provided with cleats or baffle boards across the bottom to retain pebbles or large grains of sand the size of which would be determined by the inclination of the chute and the amount of water used.

FINE GRAINS FLOATED AWAY

While the hopper is filling with sand, water should be entering from the bottom, filling the hopper and overflowing equally on all sides into the trough. The sand should continue to enter the hopper until within three or four inches of the upper edge, the water rising through it, meantime separating out the earth, loam and smallest grains of sand, holding them in suspension and carrying them over the edge to the trough.

By adjusting the valve, the amount of water and the velocity of flow through the sand can be regulated accurately so as to carry with it larger and larger grains of sand as the flow increases. It should be carefully watched and tested until it is regulated to carry away all materials less than 0.25 millimeter in diameter.

When the overflow runs free and clear the valves should be closed and the door in the side of the hopper opened and lowered to the inclined position, forming a chute over which the sand can be discharged to a car, bucket, or box provided to receive it. The door is then closed and the operations repeated over and over again. The hopper can be filled and emptied rapidly by one man, who can grade many yards per day.

SEPARATION OF COARSE GRAINS

If it is found that there is too much coarse sand, it can easily be removed by passing the washed sand through the hopper a second time and on this occasion increasing the pressure and velocity of the waters sufficiently to carry over in the overflow all of the sand that is 0.25 millimeters in diameter and smaller than the minimum size of rejects. This sand, instead of being wasted by the overflow, should be collected and saved and the larger grains of sand remaining in the hopper will be available for any other purpose.

As this operation depends entirely upon the amount of material removed by the water at different velocities it can be easily regulated and accurate results obtained with rapidity by the adjustment of the valves to control the flow of water.

The apparatus here described may be modified in various ways to suit the nature of the sand, the amount required and various other conditions.

A more elaborate sand washing hopper is described on page 85 of the third edition of "Water Supply Engineering," A. P. Folwell. In this case the hopper is made of cast iron and is provided at the bottom with an ejector for removing the graded sand by water pressure.

AMOUNT OF WATER

The amount of water required for grading the sand may be found approximately by the formula

$$W = \frac{A\ D}{0.0195}$$

where W is the amount of water in gallons per minute, D is the diameter of the required sand grains in millimeters, and A is the area of the top of the box in square feet. Substituting and reducing we have

$$W = \frac{9 \times 0.25}{0.0195} = 115$$

Federal Aid Appropriation Postponed

Although strenuous efforts were made to put through a $100,000,000 appropriation for good roads in the present session of Congress this has been found impossible, but it seems almost certain that a bill appropriating this amount will be passed by the middle of the summer. The bill was added as a rider to the post office appropriation bill and it was partly for this reason that it was defeated. Senator Townsend, chairman of the post office committee, was in favor of a bill providing for interstate highways to be built by the government but there is apparently no chance of his getting such a bill through. However, it seems possible that he will secure modifications of the present regulations governing federal aid, the principal of these being that none of it shall be appropriated for dirt roads, but that only durable or paved roads shall be aided, and that there shall be more effective inspection of a road before federal money is paid out for it.

NEWS OF THE SOCIETIES

March 22—PHILADELPHIA, PA., SECTION, AMERICAN SOCIETY OF MECHANICAL ENGINEERS. Engineer's Club.

March 22—ATLANTA, GA., SECTION, AMERICAN SOCIETY OF MECHANICAL ENGINEERS. Carnegie Library, Atlanta.

March 22—BALTIMORE, MD., SECTION, AMERICAN SOCIETY OF MECHANICAL ENGINEERS. Engineers' Club.

March 23-24—AMERICAN WATER WORKS ASSOCIATION. Illinois Section. Annual meeting, Chicago, C. C. Habermeyer, Secretary, Urbana, Ill.

March 25 — KANSAS CITY SECTION, AMERICAN INSTITUTE OF ELECTRICAL ENGINEERS. Northeast Power House of Kansas City Light & Power Co.,

March 25—SAN FRANCISCO SECTION, AMERICAN INSTITUTE OF ELECTRICAL ENGINEERS. Substation of United R. R. of San Francisco.

March 25—COLORADO SECTION, AMERICAN SOCIETY OF MECHANICAL ENGINEERS. Metropole Hotel, Denver.

March 25—METROPOLITAN SECTION, AMERICAN SOCIETY OF MECHANICAL ENGINEERS. Engineering Society Building, New York City.

March 30—INTERNATIONAL ASSOCIATION OF FIRE ENGINEERS. Directors' meeting. Atlanta, Ga. Secretary, James T. Mulcahey, Yonkers, N. Y.

April 1 — VANCOUVER SECTION, AMERICAN INSTITUTE OF ELECTRICAL ENGINEERS.

April 11 — HARTFORD SECTION, AMERICAN SOCIETY OF MECHANICAL ENGINEERS. City Club, Hartford. Conn.

April 14—SAN FRANCISCO SECTION, AMERICAN SOCIETY OF MECHANICAL ENGINEERS.

April 15 — MERIDEN SECTION, AMERICAN SOCIETY OF MECHANICAL ENGINEERS.

April 16—AMERICAN INSTITUTE OF ELECTRICAL ENGINEERS. Joint meeting with the Association of Iron and Steel Electrical Engineers. Pittsburgh, Pa.

April 18-23 — UNITED STATES GOOD ROADS ASSOCIATION. Greensboro, N. C.

April 21-22—BANKHEAD NATIONAL HIGHWAY ASSOCIATION. 5th annual convention. Greensboro, N. C. Secretary, J. A. Routree, Birmingham, Ala.

April 22 — REGIONAL MEETING, AMERICAN SOCIETY OF MECHANICAL ENGINEERS. Joint meeting of Atlanta, Birmingham, New Orleans sections. A. S. M. E. Council to attend. Mobile, Ala.

April 22 — METROPOLITAN SECTION, AMERICAN SOCIETY OF MECHANICAL ENGINEERS. Joint meeting with American Institute of Electrical Engineers.

April 22—BIRMINGHAM SECTION, AMERICAN SOCIETY OF MECHANICAL ENGINEERS. Joint meeting with Atlanta, Birmingham and New Orleans sections, with members of Council present. Battle House, Mobile, Ala.

April 27—AMERICAN SOCIETY OF CIVIL ENGINEERS. Annual convention. Houston, Texas.

April 27-29—UNITED STATES CHAMBER OF COMMERCE. 9th annual meetin Atlantic City, N. J.

April 27-29 — BUILDING OFFICIAL'S CONFERENCE. Seventh annual meeting. Cleveland, Ohio.

April 28-29—MID-CONTINENT SECTION, AMERICAN SOCIETY OF MECHANICAL ENGINEERS. Joint meeting of Chemical Eng. Societies. City Auditorium or Convention Hall, Tulsa, Okla.

April 29 — EASTERN NEW YORK SECTION, AMERICAN SOCIETY OF MECHANICAL ENGINEERS. Edison Club Hall, Schenectady.

April 29 — COLORADO SECTION, AMERICAN SOCIETY OF MECHANICAL ENGINEERS. Metropole Hote..

May 2-4—MISSISSIPPI VALLEY ASSOCIATION. 3d annual convention. New Orleans, La.

TRADE CONVENTION. 8th conven-

May 4-7—NATIONAL FOREIGN tion. Cleveland, Ohio.

May 9-11—AMERICAN ASSOCIATION OF ENGINEERS. 7th annual convention. Buffalo.

May 9-12—SOUNTHWEST WATER WORKS ASSOCIATION. Shirvin Hotel Headquarters, Oklahoma City, Okla.

May 9-12 — SOUTH-WEST WATER WORKS ASSOCIATION. Oklahoma City. Headquarters Skirvin Hotel.

May 17-19—NATIONAL FIREMEN'S ASSOCIATION. Twenty-third annual convention. Fort Wayne .Ind.

May 19 — SAN FRANCISCO SECTION, AMERICAN SOCIETY OF MECHANICAL ENGINEERS.

May 20 — AMERICAN INSTITUTE OF ELECTRICAL ENGINEERS. 370th meeting. Engineering Societies Building, New York City.

May 23-26 — AMERICAN SOCIETY OF MECHANICAL ENGINEERS. Spring meeting. Congress Hotel, Chicago.

June—CONFERENCE OF MAYORS AND OTHER CITY OFFICIALS, State of N. Y. 12th Annual Conference. Elmira, N. Y.

June 6-10—AMERICAN WATER TER WORKS ASSOCIATION. Annual convention at Cleveland, Ohio. Secretary, J. M. Diven, 153 West 71st St., New York

June 7-9—NATIONAL FIRE PROTECTION ASSOCIATION. Annual meeting. San Francisco, Cal.

June 21-24 — AMERICAN INSTITUTE OF ELECTRICAL ENGINEERS. Annual and Pacific Coast Convention. Salt Lake City.

ENGINEERING COUNCIL PETITIONS PRESIDENT HARDING

The American Engineering Council of the Federated American Engineering Societies has sent to President Harding a communication asking that an engineer be appointed Assistant Secretary of War. Another communication requested Mr. Harding to name an engineer for the vacancy on the Interstate Commerce Commission. Both communications were authorized by vote of the Executive Board of the council, of which Herbert Hoover is president, and which represents 150,000 American engineers.

The council is now conducting an active campaign to reorganize the United States Patent Office. The establishment of a National Department of Public Works is another aim of the engineers. The appeal to Mr. Harding to select an engineer as Assistant Secretary of War states that this position is one requiring "very special qualifications, a large part of which are concerned with engineering." The appointee must possess technical knowledge and executive ability and must be familiar with cost of construction and operation as well as having experience with various types of employees. The engineers are furthering the interests of no individual or group, but desire only to serve the nation by improving its administrative departments.

NATIONAL FEDERATION OF CONSTRUCTION INDUSTRIES

At the Chicago convention March 2 and 3 resolutions were passed urging manufacturers, producers, and distributors of builders' materials to make further reductions, establish reliable permanent prices and publish the reasons why certain increases were necessary above pre-war rates; urging contractors, builders, employers and others to create the basis of labor cost conforming with present conditions and requirements for the re-establishment of industry, readjusting wages and eliminating labor instability so as to secure maximum production and minimum expenses; urging financial interests to make maximum loans for building construction; urging transportation companies to eliminate all inefficiency in operation and to reduce expenses to a minimum; urging coal mine owners and operators to improve methods of mining and marketing, eliminate waste, and secure maximum efficiency with labor rates in accordance with present conditions, thus reducing the cost of fuel.

The federal, state, and municipal governments are urged to eliminate all unnecessary expense and reduce the tax burden; all organizations and individuals connected with construction are urged not to enter into any agreement that can tend to the injury of the public or to unnecessary increase of the cost of construction. The conference called for the appointment of a Central Direction Committee to contain representatives of the elements entering into the construction industry who shall prepare a plan for local conferences throughout the United States, cooperate with construction industries and take other action to promote the revival of construction activities. The conference also sent a telegram to President Harding appreciating his endorsement and offering him full and complete co-operation.

HARTFORD SECTION, AMERICAN SOCIETY OF MECHANICAL ENGINEERS

A joint meeting of the Hartford section of the A. S. M. E. with the Connecticut Valley section of the American Chemical Society will be held at the City Club, Hartford, on April 11. Members of all national societies are invited, and the subject will be the "Corrosion of Metal Surfaces."

SOUTHWEST WATER WORKS ASSOCIATION

The convention of the Southwest Water Works Association, to be held at the Skirvin Hotel, Oklahoma City, Okla., on May 9 to 12, inclusive, is expected to be a very successful one. A large attendance is anticipated and papers will be presented from the State Board of Health of different states.

WYOMING ENGINEERING SOCIETY

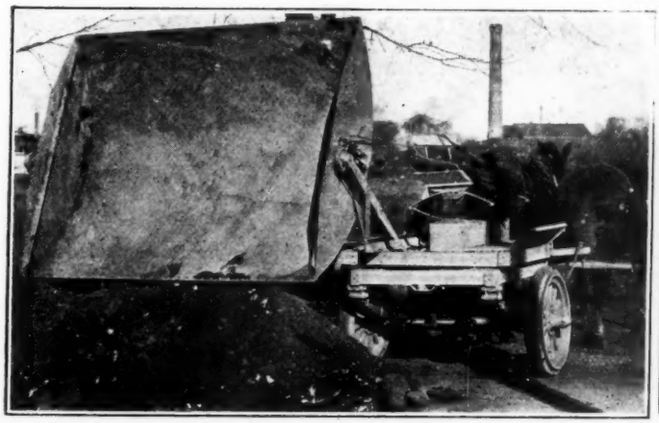
The Wyoming Engineering Society at a recent meeting elected the following officers for the coming year: President, Ambrose Hemingway; vice-president, James Wisda; and secretary-treasurer, Henry Watson.

SEATTLE SECTION, AMERICAN SOCIETY OF CIVIL ENGINEERS

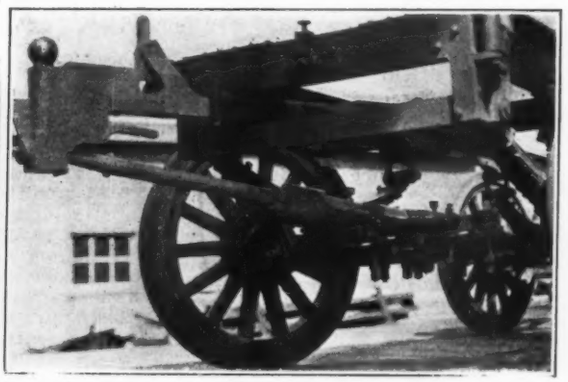
The following officers were elected at a meeting held on January 31 of the Seattle section, American Society of Civil Engineers: President, T. E. Phipps; vice-president, Bertram D. Dean; and secretary-treasurer, Frank H. Fowler.

New Appliances

Describing New Machinery, Apparatus, Materials and Methods and Recent Interesting Installations



SHOWING COMPLETE DISCHARGE OF LOAD, BODY CLEANING DUMPAGE, AND TEAM AT RIGHT ANGLES TO TRAILER



STEERING BAR WITH LONG LEVERAGE CONNECTED TO EXTREME FRONT END OF DRAWBAR

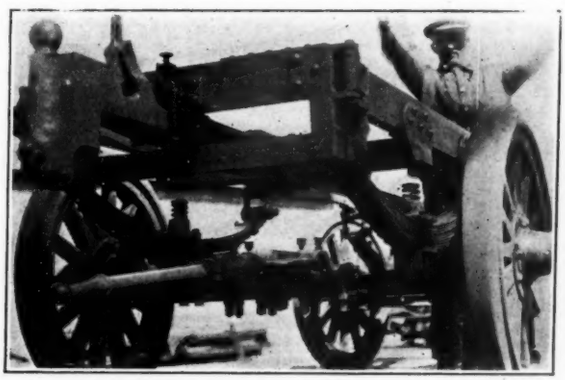
WARREN HEAVY DUTY TRUCK TRAILERS

The Warren Manufacturing Copmany has completed arrangements for the production of a new type heavy 2, 3 and 5-ton 4-wheel truck trailers that have been experimented with and tested for more than two years and are protected by a number of patents.

The proper tracking of the trailers with the trucks has been solved by providing a steering arrangement with long leverage that guarantees complete control and eliminates any possibility of deviation from the arc of the truck.

Radical changes from former practice provide for an attachment from the steering arrangement to the draw-bar when the trailer moves forward and with the axle in a locked central position when the trailer is backed, thus eliminating the possibility of knifing the draw-bar when the trailer gets into a cramped position.

When the trailer is backed the front wheels are locked parallel to the frame and the draw-bar is disconnected from the steering gear and is free to swing to either side while the trailer is guided by an auxiliary steering gear applied to its rear end.



SHOWING STEERING BAR ENGAGED TO AXLE, FIXING FRONT WHEELS FOR BACKING UP.

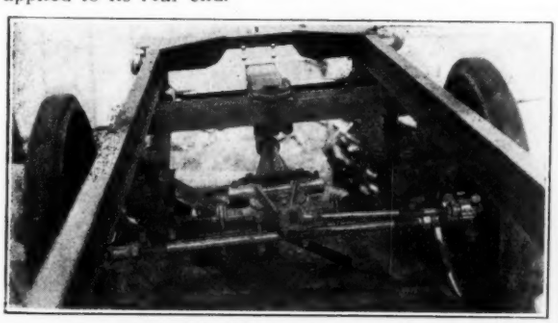
In extreme cases, as for making very small circles, both sets of trailer wheels can be clamped at any angle, thus permitting the movement of the trailer around any obstacle.

The Warren principle of ball and socket joint connections is applied to the steering gear attachment which has been made fool-proof and can easily be used on old models of trailers as well as new ones. With it, it is believed that all objections to the use of 4-wheel trailers has been removed.

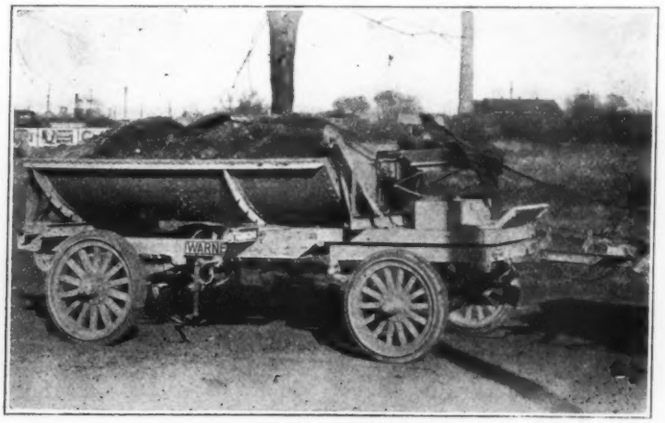
The principal advantages claimed for the new two-way dump body offered with trailers are its low price; durability; facility for handling municipal ashes, rubbish and garbage; its interchangeability with other bodies on the same trailer; simple construction; short turning radius of the trailer; clearance of body over dumpage; constant control of body by cables; light weight making it possible to haul trailer by tractor truck, horses or mules and quick operation, enabling the body to dump and to be returned by gravity to horizontal position in 50 seconds.

CIVIL ENGINEERS' SUPPLIES

Engineers and surveyors will be interested in a 40-page catalog of field and office supplies just issued by the C. F. Pease Co. This book lists drawing, profile and cross-section papers, tracing cloths, blueprint papers and



SHOWING STEERING KNUCKLE AXLE AND STEERING ARMS CONTROLLED BY TIE ROD, DRAG LINK AND STEERING ARM.



LOADING EDGE 60 INCHES FROM GROUND ONLY

BITOSLAG PAVING ON LINCOLN HIGHWAY, NEW CASTLE COUNTY, DELAWARE

MANHOLE TOP AND COVER

blueprinting machines, drafting room furniture and such field supplies as transits, levels, ranging poles, leveling rods, etc. Prices and descriptions of each article are given and the book is very fully illustrated.

BITOSLAG PAVEMENT

Bitoslag paving material is a mixture of general aggregate, preferably slag, a filler and asphalt, known as bitocement. It is recommended for its homogeneity, density and wearing qualities, suited to resist heavy traffic. It is impervious to moisture and unaffected by temperature changes, is very durable and has rigidity sufficient to withstand traffic strain, with enough malleability to prevent chipping and breaking. The blast furnace slag used is very hard and has great tensile strength. Its fracture is irregular, providing for very intimate bond between it and the special bitocement binder, which possesses great rigidity and toughness.

The bitoslag paving mixture may be laid on concrete base, old macadam, old brick pavement, or any other suitable foundation over which the mixture of general aggregate, lime and bitocement is spread and rolled, forming a dense and durable wearing course that is watertight and extremely tough. Bitoslag mixture is manufactured in regular asphalt paving plants and any plant of standard make is capable of producing it.

EARTH CRETE

"Earthcrete," a road material manufactured by the Earth Concrete Company, is used to promote the utilization of earthy material found alongside the right-of-way in order to effect a saving in crushed rock, sand and gravel required in the road bed.

In use it is recommended to dissolve 4 ounces of earthcrete in the water used for one sack of cement, which is combined with five parts of clay, sand, gumbo or other soil free from vegetable matter, and thoroughly wet and mixed like mortar or concrete. It is recommended as a foundation for asphalt, brick and other paving surfaces and is reported to offer good resistance to weather and traffic.

UNIVERSAL BARS

Universal bars for corner protection and joint protection in concrete construction are sold by the Universal Concrete Bar Company and are used to protect straight and curved curbs, to protect exposed corners in general concrete construction, and to provide for construction joints in roads, pavements, walls, buildings and other places. They are adapted to longitudinal and transverse joints and are easily installed, self-sustained, self-anchoring, durable, strong, and economical.

They are made from 2½ x 1½ x 3/16-inch soft angles, weighing about 2½ pounds per foot and having in one flange lugs sheared down 6 inches apart to penetrate and anchor with the concrete. The full and standard lengths are 14 feet, 16 feet and 18 feet and to any practicable specified length.

GIANT CONCRETE MIXERS

Giant concrete mixers made by the Judy Manufacturing Company are recommended for general construction work and for concrete road work. They are mounted on trucks, have a powerful engine enclosed in steel housing and are equipped with either barrow, batch or power loading hoppers. They are made with a capacity for 4, 7 or 10 cubic feet of mixed concrete, and can be operated either by gasoline, A. C. or D. C. motors, or steam engines.

The advantages claimed include chilled drum rollers, adjustable roller bearing journals, over-size capacity non-slipping drums, self-aligning ball bearings for the power loading hoist, easy discharge and rapid mixing.

The catalog contains specifications, illustrations of special parts, and various convenient tables of quantities and cost of different materials and of concrete for various kinds of work.

STRAINER CAP

CONCRETE MIXER WITH NON-SLIPPING DRUM

MUNICIPAL CASTINGS

H. W. Clark Company has issued a folder illustrating Clark municipal and special castings of quality, including many different types and varieties of manhole tops and covers for sewer and water works, gratings, catch basin inlets, curb castings, doors, frames, floor plates, grate bars and other items. Correspondence is solicited and officials are invited to send sketch and measurements on which estimates will be promptly furnished.